PCT/AU00/00739
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CLAIMS

1. A method for sensing and controlling the frequency of a laser with respect to an optical cavity including the steps of introducing a misalignment in the incident laser radiation to the cavity to produce oscillation in the cavity of substantially only a TEM00 mode and a TEM01 mode, and detecting at least two spatially distinct portions of a single beam reflected from the cavity to produce at least two signals each indicative of the respective interference of the two correspondingly spatially distinct portions of the TEM00 mode with two correspondingly spatially distinct portions of the TEM01 mode, and producing an error signal indicative of the difference between the TEM 00 mode frequency and the cavity resonance frequency from the signals.
2. A method as claimed in claim 1 including the step of detecting two spatially distinct portions of said single beam of substantially equal size.
3. A method as claimed in claim 2 wherein each of said two spatially distinct portions each form about one half of the cross section of the beam.
4. A method as claimed in any one of claims 1 to 3 wherein the misalignment of the incident beam is achieved by tilting of the beam.
5. A method as claimed in any one of claims 1 to 3 wherein the misalignment of the incident beam is achieved by offsetting of the beam.
6. A method as claimed in claim 5 wherein said single beam reflected from the cavity is focused onto a detector.
7. A method for sensing and controlling a two beam interferometer such that the relative path length of the two beams is fixed, including the steps of introducing a misalignment between the two beams to produce substantially only a TEM00 mode and a TEM01 mode, detecting at least two spatially distinct portions of a single beam directed from the interferometer to produce at least two signals each indicative of the interference of the correspondingly spatially distinct portions of the TEM00 mode with the correspondingly spatially distinct portions of the TEM01 mode, and

producing an error signal indicative of the path length difference for the TEM00 modes from the signals.

8. A method as claimed in claim 7 including the step of detecting two spatially distinct portions of said single beam of substantially equal size.

9. A method as claimed in claim 8 wherein each of said two spatially distinct portions each form about one half of the cross section of the beam.

10. A method as claimed in any one of claims 7 to 9 wherein the misalignment of the incident beam is achieved by tilting of the beam.

11. A method as claimed in any one of claims 7 to 9 wherein the misalignment of the incident beam is achieved by offsetting of the beam.

12. A method as claimed in claim 11 wherein said single beam reflected from the cavity is focused onto a detector.

13. An optical system for controlling the frequency of a laser, said system including an optical cavity, means to direct laser radiation into said cavity, means to introduce a misalignment in the incident laser radiation to the cavity to produce oscillation in the cavity of substantially only a TEM00 mode and a TEM01 mode, and means to detect at least two spatially distinct portions of a single beam reflected from the cavity to produce at least two signals each indicative of the respective interference of the two correspondingly spatially distinct portions of the TEM00 mode with two correspondingly spatially distinct portions of the TEM01 mode, and produce an error signal indicative of the difference between the TEM00 mode frequency and the cavity resonance frequency from the signals.

14. An optical system as claimed in claim 13 wherein said detector means detects two spatially distinct portions of beam of substantially equal size.

15. An optical system as claimed in claim 14 wherein each of said two spatially distinct portions each form about one half of the cross section of the beam.

16. An optical system claimed in any one of claims 13 to 15 wherein the means to introduce a misalignment of the incident beam tilt of the beam.

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17. An optical system as claimed in any one of claims 13 to 15 wherein the means to introduce a misalignment of the incident beam offsets of the beam.

18. An optical system method as claimed in claim 17 wherein the single beam reflected from the cavity is focused onto a detector by a lens.

19. A two beam interferometer including means to introduce a misalignment between the two beams to produce substantially only a TEM00 mode and a TEM01 mode, means to detect at least two spatially distinct portions of a single beam directed from the interferometer and produce at least two signals each indicative of the interference of the correspondingly spatially distinct portions of the TEM00 mode with the correspondingly spatially distinct portions of the TEM01 mode, and means to produce from said two signals an error signal indicative of the path length difference for the TEM00 modes from the signals.

20. A two beam interferometer as claimed in claim 19 wherein said detector means detects two spatially distinct portions of beam of substantially equal size.

21. A two beam interferometer as claimed in claim 20 wherein each of said two spatially distinct portions each form about one half of the cross section of the beam.

22. A two beam interferometer as claimed in any one of claims 19 to 21 wherein the means to introduce a misalignment of the incident beam tilts of the beam.

23. A two beam interferometer as claimed in any one of claims 19 to 21 wherein the means to introduce a misalignment of the incident beam offsets of the beam.

24. A two beam interferometer as claimed in claim 23 wherein the single beam reflected from the cavity is focused onto a detector by a lens.